Green bond: the emperor wears no clothes

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Abstract: “Green” finance has marketed green bonds as a tool to finance projects with environmental benefits. As internalizing a negative externality amounts to paying an additional cost (such as the costs of depollution for example), the usefulness of the bond is based on the assumption that this additional cost would be, at least partially, transferred to bondholders - the buyers of green bonds - thus making finance contribute to the common good. This assumption is unrealistic. We show this in a simple way by explaining how the mechanics of the primary bond market forbid it when professional investors participate in the placement of green bonds. For such (non green) investors, the fact that the green bond is not contractually different from a traditional bond prevents them from giving it any singular value. This in turn necessarily means that the rate of return on a green bond cannot be lower than that on a traditional bond (all other things being equal). In conclusion, the green bond cannot constitute an incentive to carry out a green project.

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1. Introduction

In 2018, out of more than € 6,000bn of new bonds issued in the capital markets, around 2% were marked as green (for a total equivalent to $ 167bn). Very far from a level relevant to the financial needs of the energy and ecology transition but sufficiently significant to study its rationality, and more precisely its value.

In finance, more than in other fields, the valuation of a product is paramount. We would expect that a green bond would cost its buyer more than the standard bond (i.e. defined as non-green), at equal risk, which would create a financial incentive for its issuer to undertake the green project that this bond aims to finance.

The cornerstone of the transition indeed lies in taking into account negative externalities (such as the pollution of a factory). Truly green projects a priori incur additional costs to avoid these negative externalities, additional costs which reduce the financial profitability of the company. There is no such thing as a free lunch, if you want an additional service (like making the air breathable), it has to be paid for by someone - the company and its capital providers, the end consumers or the state, that is to say the taxpayers. This is for example what buyers of fair trade coffee accept: to allow small producers to live with minimal dignity from their work, they pay around 30% more per kg of coffee.

Take the example of a green project that differs from a brown project (defined as anti-green) only by the addition of an (expensive) carbon capture technology. If the cost of its financing is the same, the green project will be structurally less profitable for the company than the brown alternative, and it will not be chosen. If, on the other hand, the cost of its financing is cheaper, if the green project can be financed at a lower rate, a green rate, then the green project could become at least as attractive for the company as the brown project. This amounts to saying that the additional cost of the green project (compared to the brown alternative) would here be transferred to the bond lenders.

This is the rhetoric of some green bond advocates. Their claim is that there would exist investors ready to accept lower returns because they want their money to be used to finance green projects and their participation in the bond market would change the market balance in favor, therefore, of the ecological transition.

But this discourse clashes with the general risk-return paradigm that dominates financial markets. Indeed, for market players, each financial asset boils down to two numbers: the expected return and the risk. This is true for individual assets (a stock, a bond) as well as for their aggregate forms in portfolios (stock funds, bond funds, mixed funds, funds of funds, etc.). In the latter case, the risk can take into account correlations between the individual assets incorporated. Of course, a good part of the life and complexity of financial markets resides in the valuation (shared or not) of (i) the risk and (ii) the trade-off between this risk and the associated return.

This risk-return paradigm is based on the concept of no arbitrage opportunity - a financial translation of the famous “no free lunch”. This is obvious for a risk-free arbitrage, which would amount to buying an asset at a lower price than it could be sold at the same time, generating a certain profit. Many market products have functional relationships that lend themselves to this type of arbitrage (call / put parity, exchange rate transitivity, spot / term arbitrage, etc.). The markets are continuously arbitraged on this basis. This concept remains valid in the context of a “risky arbitrage” in the sense that an expectation of additional return is associated with an extra risk-taking. In other

words, at a given risk level, investors opt for the highest return. At a given return level, they opt for the least risk. This is true of individuals, of any investment fund, which are only the agents of the former and who must respect their fiduciary responsibility, or of any bank which requests return from its loans according to the risk associated with the borrower. It seems basic, but it is indeed the practice shared by all financial market players (from Joe Bloggs to the most selective hedge fund): maximizing returns on managed funds given a level of accepted risk. The implementation differs only in terms of preferences (horizon, risk tolerance, even leverage). This point of view is absolutely consensual and orthodox among market professionals.

The rest of this article will develop this introduction by showing how the bond market works, with a particularly simple relationship between risk and return, and how this functioning prevents a bond issued with a green label from being anything other than an ordinary bond with the extra green words.

2. What is a bond?

A structuring function of financial markets is to bridge supply and demand for funds. These markets are therefore the (virtual) place where supply and demand for capital meet. Demand results from the financing needs of companies and states, supply results from the willingness of people to productively invest their savings. To enable this exchange, those who need cash to finance their projects and operations sell (issue) securities to those providing the funds (the buyers of the securities, i.e. the investors). It is called disintermediation because such financing does not involve banks' balance sheets.

A bond is one of those securities, the simplest and oldest financial asset in existence. It is a debt security, a claim on the issuer of the security. It is "issued" (= sold) by a borrower (an "issuer") and placed (= bought by) with bond investors at the time of its issuance (mostly institutional investors: pension funds, insurance companies, asset managers, hedge funds, banks, corporate treasuries; sometimes individuals directly). A simple bond is characterized by a coupon rate - most often a fixed interest rate which defines the periodic interest payment - and a maturity date, i.e. the date at which the nominal value of the bond will have to be repaid (the nominal is the amount borrowed).

The primary market concerns in fact a specific moment, that of the initial sale of a new bond by an issuer to a group of investors. This placement is typically carried out through investment banks, simple intermediaries who in this role are called "arrangers" or "bookrunners" of the transaction. These banks do not buy the securities from the borrower in this transaction, they do not carry them on their balance sheets, they simply bridge the supply of the issuer with the demand of the investors. The new bond is in fact a collection of strictly identical bond securities. The granular investment is made possible by the use of reasonable denomination - for example, € 1000. This would mean in this case that a borrower issuing 1 billion euros, would in reality simultaneously issue 1 million bonds with a nominal value of € 1000 each. In everyday language, the bond of the borrower ABC (in the sense of its total amount of 1 billion euros) is confused with its unit component (the title of denomination 1000 €).

The secondary market is the market for buying and reselling an amount of this (now) existing bonds between two investors - generally an over-the-counter transaction, unlike those that take place on stock exchange for listed shares. This amount will be at least one unit bond (nominal of € 1,000).

There are rights associated with the purchase of a given financial security. Particularly financial. The price (today) of any financial asset is the present value of all future income to which its holding gives right, calculated with a discount rate corresponding to the expected return on the security. The general formula is as follows:

$$P = \mathbf{\Sigma}_t \, R_t/(1+i+s)^t \quad \text{(from t=1 to t=}\infty\text{)}$$

where R_t is the future income at t; i is a "risk-free" interest rate; s is the risk premium associated with the asset. The sum can of course end before infinity, in year N, with the last flow R_N flow being either a resale price or a redemption price.

For a bond, the formula (in percentage) is particularly simple since the R_t are all known and equal to the fixed coupon rate (C%), until maturity (N), date on which the nominal value is reimbursed (at par, 100%). The formula, which is of practical use in the bond market (it does serve to calculate prices), therefore becomes:

$$P(i,s) = \mathbf{\Sigma}_p \, C/(1+i+s)^p + 100/(1+i+s)^N \quad \text{(from p=1 to p=N)}$$

The bondholder is therefore essentially exposed to two different risks:

- a credit or default risk which is specific to the issuer. It is represented by the premium "s" (also called credit spread) in the formula. The bond is risky in the sense that the borrower can default: he can stop paying the interest due and / or not repay the nominal when due. This credit premium is generally an increasing function of the maturity at a given issuer risk (the further in time we lend, the greater the uncertainty, the greater the risk of borrower default) and decreasing function of the quality of the credit at a given maturity (the higher the default risk, the higher the premium).
- an interest rate risk linked to market trends (this rate is represented by the "i"). The bond is by nature a rate product whose valuation depends on the evolution of market interest rates. When the rate goes up, the price of an existing bond goes down, and vice versa ("i" is in the denominators in the formula).

These risks can be addressed independently through differentiated management of the interest rate and the credit components, for example via interest rate derivatives (asset swaps).

A liquidity risk should be added. This is the risk relating to the feasibility of reselling the title in case of need. It is linked both to the general state of the market and to the specific title. It is impossible to model it satisfactorily. When the markets collapse, there are no more buyers, there is no more liquidity.

The sum of the credit spread (the "s") and the "risk-free" rate (the "i"), of course, constitutes the bond's rate of return. The "i" is a commonly shared and perfectly observable reference, depending on the market and the maturity considered. For example, on the Euro bond market, it will be a swap rate whose maturity corresponds to that of the bond (a swap rate is a reference used in an interest rate

swap, i.e. a contract where a stream of fixed interest payments is exchanged for a floating Euribor-based one on a specified principal amount). The potential debate on the bond pricing would therefore solely be focused on the credit premium, "i" again being an observable market data.

If the formula clearly expresses that the bond confers on its buyer a single right, that of receiving the coupons each year and to be reimbursed on the maturity date, in fine, it does not explicitly reflect a notion extremely important for bondholders, which is that this right is strictly the same for all holders (existing and future!) of bonds issued by a given borrower. They are said to be *pari passu* among themselves. That is to say that the borrower commits to provide these investors with the same guarantees and protections but above all, with the same advantages that he might have to grant in the future to other bond investors (of the same rank - here we steer clear of structural subordination which can be contracted in a transparent manner because it does not particularly concern our green bond subject). This provision therefore establishes solidarity, legal equality between bond investors in the same debtor. In particular, it avoids the possibility that, in the event of financial difficulties leading to a bankruptcy procedure, the bondholders of the same debtor can each assert collateral giving them different ranks. It is easy to understand the interest for the bond market of such a construction, which is crucial in terms of bond law.

Moreover, the body of the debt securities holders has a legal personality. It represents bondholders through representatives, who are competent when it comes to defending the common interests of all bondholders. These representatives have, in principle, the power to carry out, on behalf of the group, all acts of management in defense of the common interests of the bondholders. They have access to general meetings of shareholders as observers without voting rights.

Ultimately, the credit risk of a bond depends only on the borrower's ability to repay its debt, overall. This is what the borrower's credit quality measures, this credit quality that rating agencies claim to capture. A credit rating which measures, at a given moment, a probability of default ("Probability of Default") multiplied by a hypothetical recovery rate in the event of default ("Loss Given Default": an assessment of the loss incurred in the event of default by the borrower - the holder will ultimately receive a certain percentage of the lended nominal). There is therefore no different treatment of bonds (of the same rank): they carry the same risk. In other words, "s" depends only on the issuer (the borrower and all of its senior bonds have the same credit rating). Any bondholder will share the same risk with any other - that the bonds of some have been used to finance green projects and those of others brown projects will not matter at all in this instance.

Communication around bond issuance is common market practice - it is advisable to give investors some information on the use of the funds raised (the so-called "Use of Proceeds"). Acquisition, refinancing, "general corporate purpose", etc. This is usually done through a quick investor call, if the amount sought is modest in relation to market standards. Its purpose is less about the financed project itself than to give the assurance to the buyers that the public information currently available reflects the exact financial situation of the issuer - in fact it is a rather formal credit update. When the size of the issue is considerable (compared to the issuer's standard) and / or the transaction to be financed is exceptional and /or has downgraded the issuer's credit quality (by increasing its debt leverage for example), it is usual for the borrower to do bond roadshows to offer a more complete review of the "fundamentals" of its credit.

Anyway, whatever is said before (and to allow) the launch of a new bond, it must be recognized that the new funds raised will be fungible with all the liquidity available to the issuer. The

solidarity between bondholders we have just described therefore exists from the very inception of the new issuance - regardless of the use of the proceeds. In summary, we can say that, through the primary bond market, one structurally finances a borrower, rather than any particular project.

3. What is a green bond?

According to the International Capital Market Association [2018] which defines the Green Bond Principles (GBP): “Green Bonds are any type of bond instrument where the proceeds or an equivalent amount will be exclusively applied to finance or re-finance, in part or in full, new and/or existing eligible Green Projects and which are aligned with the four core components of the GBP”. According to the AMF [2018]: “the only notable difference from standard bonds is in the commitments made by the issuer on the use of funds”.

As seen above, communication on the purpose of a new bond issuance to the investors is usual. What is different here is that the borrower indicates that the funds raised will be used to finance green projects (in the sense of presenting an “environmental benefit”).

The GBP are only “voluntary process guidelines”, so they only make recommendations, on 1. use of proceeds, 2. process for project evaluation and selection, 3. management of proceeds, and 4. reporting. Green bonds are therefore self-declared as such by the issuers themselves. There are no reglementations or even regulations concerning this (up to now uncontrolled) label.

Together, points 3 and 4 cover a requirement for traceability of borrowed funds. We have seen that, in the traditional bond framework, the funds raised are fungible with all the liquidity of the issuer. Points 3 and 4 therefore attempt to create a form of link between the funds raised and the green project(s) considered.

Note that it is the bond that is green, not its issuer. A big polluter can therefore issue green bonds (in accordance with the GBP - it is sufficient to have a “compatible” project) as well as standard bonds (those possibly financing brown projects).

The green bond is therefore a standard bond plus a green promise. Any financial security is a promise. An obligation in particular is a promise of future payments by the issuer, but a promise that obligates (obligatio) the person who made it before the law. The ICMA writes that “the raison d'être of a green bond issue is to use the funds raised to finance green projects. These projects must be properly described in the prospectus describing the issuance”, but do not say exactly where in the prospectus. This is, however, a crucial point. Indeed, it turns out that this commitment appears only in the commercial documentation as a simple declaration of intent. It does not appear in the contractual commitments of the issuer. It appears in the legal bond documentation only as a simple information (example of the Unibail-Rodemco green bond [2014]). This commitment therefore has zero legal value. Moreover, if necessary, the risk factors section of the legal documentation, which lists all the risks to which bond buyers are potentially exposed, repeats it again that there is no potential recourse for the buyer in case of broken promise.

The green promise therefore does not contractually provide any additional rights to the buyer of the green bond. The buyer of the green bond does not have any particular right of scrutiny, no more over the green project financed by the bond than over the general operation of the issuing company.

Indeed, a bondholder does not have voting rights, he does not have a vote at the general shareholders meeting. Even more structuring, the green promise offers no additional financial rights at all. If it was observed, ex-post, that the commitment on the use of funds was not respected, or that the associated commitments (points 3 and 4), on the segregation of funds or reporting, were not not respected, the buyer would not benefit from any particular advantage modifying in his favor the financial profile (the risk-return) of his investment - neither financial compensation, nor early redemption option, strictly nothing that could modify the valuation of the bond he holds.

4. The distribution of a green bond always involves (traditional) investors who cannot give any monetary value to the green promise

There is only one primary bond market. There is not, on one side, a primary market for green bonds and "green" investors, and on another a primary market for standard bonds and traditional investors. This means that traditional investors participate in green bond issues. This point is absolutely consensual, including among the promoters of the green bond, and confirmed by the bookrunners themselves who systematically analyze the placement of each new issue. Moreover, the funds dedicated to green bonds remain paltry in terms of the size of the green bond market (€ 6bn in funds exclusively dedicated to green bonds vs. around € 600bn in outstanding issued to date). The entire new issuance is therefore sold at a single price to all participants in the primary offering, thus including traditional bond investors - who represent in fact the majority of the placement. This point is crucial since it will ultimately imply that the price of the green bond is established in the market precisely by these traditional buyers as we will show.

To explain why traditional investors cannot give any monetary value to the green promise, we can, without limiting the scope of our analysis, restrict ourselves to green bond issuers who also issue standard bonds. They actually constitute the vast majority of issuers of green bonds (they are the frequent issuers of the bond market: certain states like France, supranationals, large companies like EDF, big banks, etc.). This will allow the direct comparison of prices between green bond and standard bond of a given borrower ABC, i.e. at constant credit risk (for example green OAT vs. standard OAT), thus avoiding any credit bias (which would result from the comparison involving different borrowers: ABC green bond vs. standard DEF bond). Note that we can reason on the prices because there is no tax treatment differentiating green bonds and standard bonds.

Traditional buyers of the ABC green bond therefore find themselves *pari passu* with holders of standard bonds issued by the SAME ABC borrower. That is to say, they have exactly the same rights (in particular in the event of default). Therefore, if we compare a green bond to a standard "equivalent" bond from the same issuer, i.e. with the exact same financial characteristics (same maturity, same coupon, same legal format), financial flows streams would be strictly identical, as well as all the parameters that determine the return rate (the "s" and "i" are exactly the same). The bond pricing formula therefore tells us that the prices of these two bonds must be strictly equal. In the risk-return paradigm, for a given issuer, and therefore at a given credit risk, a green bond will necessarily be valued by the traditional investor exactly like a standard "equivalent" bond. For him, the risk-return of the green bond is necessarily identical to the risk-return of the traditional bond. Without any further consideration, the principle of fiduciary responsibility prohibits the traditional investor from paying any green premium.

Despite this fundamental point, the narrative of those who support the existence of a green premium relies on the existence of “green” investors who would play a favorable role in the pricing of the green bond. Favorable here means that their additional “green” subscription would obviously result in a premium for the benefit of the issuer (a price premium paid by investors is the same as a negative rate premium for the issuer). This means that, by the weight of these benevolent “green” investors on the primary market, the price of the green bond would ultimately be higher for all its buyers (resulting in a lower rate for the issuer) than if only the traditional investors were participating. We have just seen that, for the latter, this premium should normally be zero. The point here is neither more nor less than recycling the totemic classical microeconomic theory where over-demand leads to a favorable shift in the supply-demand equilibrium point. But this narrative presents two flaws - each one suffices in itself to refute the premium assumption.

5. Flaw n ° 1: so-called “green” investors have the same rationality as others

While some market observers speak of a high proportion of “green” investors participating in green bond issuance, they do not analyze who these supposedly supporting "green" investors are. In reality, no one knows what a "green" investor is because there is no equivalent of “principles” defining them.

The form is again that of a self-declaration (in the best case) but the actual observation of the primary order books (the collection of bids of buyers of a new bond issuance) is not available. In fact, the primary books, including the final allocation of public issuances, are confidential data, and therefore not available (we cannot know which investor requested what amount of the new bond, and even less at what exact price).

Of course, “green” investors cannot identify with those who buy green bonds, since we noted that they are largely placed with traditional investors. Moreover, when the World Bank issued the first green bond in 2008, there were of course no “green” investors… The buyers of this bond as well as the following were the usual buyers of World Bank credit. Following the volumes issued, the marketing associated with the green bonds, there is no doubt that there has been a certain specialization of traditional investors with particular objectives targeting the financing of green projects, whether through dedicated portfolios or dedicated entities. But these green funds remain paltry in amounts overall, their total being much smaller than the sheer size of the green bond market itself.

The fundamental point here is that, above all, these few “green” investors share the same rationality, the same risk-return paradigm, as the others. Not only do they not claim otherwise, they often claim it explicitly. We cannot establish it here name by name (which ones by the way?). We would ask readers interested in this point to read (completely) any description of green funds or any survey on the subject.

By way of illustration, we will cite two here, produced by the asset manager Schroders [2018, 2019].
A 2018 study targeted institutional investors: 650 were surveyed, including 250 in Europe, representing $ 24 trillion in assets under management. It concluded that sustainability plays only a minor role in the decision-making process of global investors. This dimension ranked 9th and penultimate in the decision criteria of institutional investors. Here is the exact ranking: 1. strategic

asset allocation, 2. fund manager track record of , 3. expected return, 4. risk tolerance, 5. investment committee, 6. tactical allocation, 7. defined time horizon, 8. past performance, 9. focus on the sustainability of the investment, 10. consultants' recommendations.
Another 2019 study targeted individuals this time (25,000 respondents): it shows the same thing. "Concerned about sustainability, however, investors continue to prioritize performance." The ranking of factors is as follows: 1. avoid losing money, 2. achieve my total performance goal, 3. generate my expected level of income, 4. reasonable fees, 5. my money is invested in sustainable investments".

This consistency is expected since what is true at the level of individuals must be true at the institutional level, the latter managing the money of the former ("Other People's Money"). The principle of fiduciary responsibility is king.

To reflect this reality even more directly, we want to quote PGGM [2019], the second largest Dutch pension fund:

- "The green zone is the responsible zone. Investors in this zone do their best to contribute to a more sustainable world, provided this is not to the detriment of the performance expected by their beneficiaries. In this area, the idea is to contribute to societal performance as long as it does not affect individual financial performance. In this zone, investors consider that contributing to sustainable development within the framework of their mandate is one of their intrinsic motivations;
- the red zone: in this zone, the contribution to the collective good is made by sacrificing part of the individual good. This would result in a reduction in the retirement pension of beneficiaries in order to contribute to a sustainable world. This is the zone of the tragedy of the commons and the tragedy of the horizon, to use Mark Carney's expression. This option is outside the mandate of pension fund managers".

One cannot be clearer. We can clearly see here that the "new frontier" of finance is the old one. Okay to contribute to "societal performance" (whatever that means in this case), but as long as it doesn't affect financial performance. Professional investors actually all say so explicitly. This will not prevent the second Schroders study from circulating with a formidable slogan: "57% of people consider factors of sustainability in the selection of their investments". This is true, but the most traditional financial motivations (traditional risk-return arbitrage) always take precedence over sustainability, so it is a preference for sustainability, all other things being equal, de facto subordinate to financial performance. A preference that does not mean much anymore, a preference that does not agree to give up without counterpart the smallest fraction of profitability - for example to buy a green bond above the price dictated by its discounted cash flows…

The first flaw, therefore, is that such additional "green" demand, expressed thus at a price level strictly identical to the value recognized by traditional investors, will obviously not change the price of the bond issue. This is simply no bid above market prices.

But maybe some investors are breaking out of the universal risk-return paradigm? One might think (i) that a simple declaration could have an impact on the price of a financial asset (as, for example, that of a CEO at the general shareholders meeting can influence the company's share price) and (ii) that there would be investors willing to pay a premium for the simple green promise made to them - we will call them in the following "virtuous" investors.

Note that the existence of a “virtuous” investor is a very strong assumption. Concretely, if the market price of a new standard bond for issuer ABC was 3% at 10 years, this would mean that a “virtuous” investor would be ready to buy more expensively, for example at 2%, an “equivalent” green bond (with the exact same financial characteristics), although the green promise, as we have seen, does not contractually offer him any additional rights, and in particular no financial trade-off whatsoever. One must therefore imagine that a “virtuous” investor is prepared to pay more (the green price premium) for the moral benefit generated by the financing of the underlying green project.

Given the principle of fiduciary responsibility, the commitment of such a “virtuous” investor would need to be fully described by the principals to their agents, the fund managers. That seems quite impossible, especially when it comes to collective funds: how to calibrate the amount of green premiums allowed? Based on credit premiums, returns, issuers, shades of green of the projects? It should also be understood that this would be a real subsidy granted by these “virtuous” investors to the issuer, via the financing of its green project. Indeed, the rate differential (3% minus 2% in our example), would in fact improve its profitability by reducing the interest charge on the considered green debt, and this for the final benefit of all the other capital providers of the borrower - all the other bondholders then all the shareholders, since it is indeed all the cash-flows, here improved, which first allows the debt service in a solidarity manner, then the possible dividend payment to shareholders (remember the company's Cash Flow = Earnings - Interest - Tax - Dividends).

6. Flaw n ° 2: no “virtuous” investor would change the green bond pricing rationality

We have noted that any additional demand at the normal market value will obviously not change the price of the bond issue. Indeed, if 50 investors are buyers at a credit spread of 54 basis points (basis point abbreviated by bp(s) - equals to 0,01%) for a total of 1 billion euros, 10 additional “virtuous” investors at the same level for a total of € 150m will not change the outcome of the pricing process. The arrangers will simply reduce the investors allocations participating in the transaction (at the given price, each will have a reduced allocated amount compared to their request).

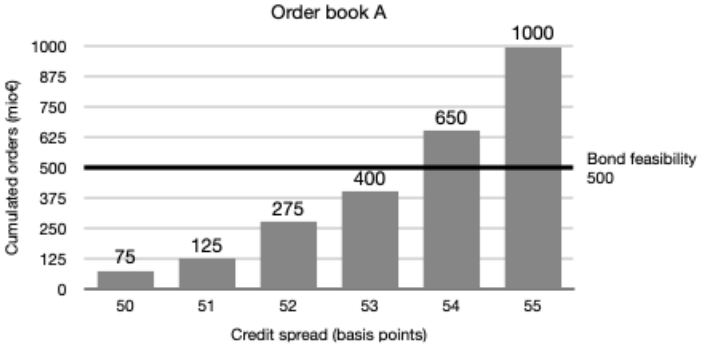
Let us develop a reductio ad absurdum argument, assuming that a “virtuous” demand manifests itself at a higher price (therefore at a lower credit spread) and see how this cannot change either the new issue price.

The primary bond market is not a market in the most traditional sense in economics, that is, a mechanism by which buyers and sellers interact to determine the price and quantity of a good. The primary book building process does not lead to a point of equilibrium which can shift continuously as shown in the classical microeconomic representation of an intersection point of a decreasing demand curve and an increasing supply curve depending on the price. The quantity here is quasi-fixed. The final credit spread is not even an average of investor orders. The primary pricing process is extremely structured and aims to achieve the best possible outcome for the issuer by collecting orders from the highest price (the lowest spread) to the lowest price (the highest spread). In reality, the entire issue (the aggregate of unit bonds) which is sold at a single price to all the participants in the primary offering is structured around the investor heavyweights’ bids (the so-called lead orders), actual price-makers because they are decisive for the feasibility of the deal. They are sought after as its anchor. The other investors simply follow.

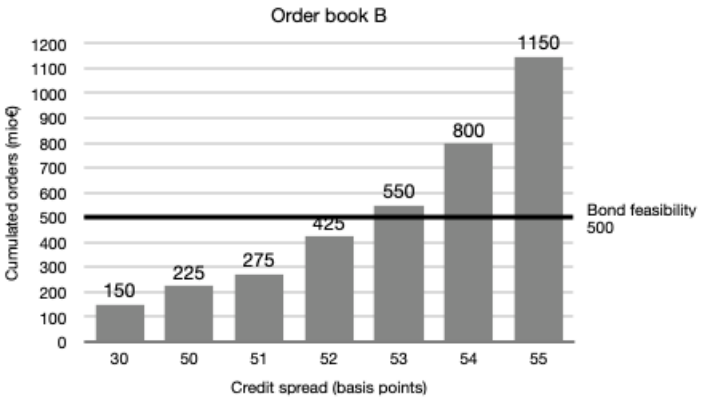
The hypothesis of the participation of theoretical “virtuous” investors therefore changes almost nothing because the demand necessary to complete the placement will always be at the price of the buyers of pure credit, those buyers who respect their fiduciary responsibility and who will never give any financial value to the green promise, those investors who will never give up their risk-return paradigm. Remember that these same buyers can easily buy the same credit in standard format on the secondary market or at the borrower's next standard issuance. The pricing discussion is relatively transparent since investors have secondary references.

To illustrate the point, let's consider two order books for a new € 500m bond issue, whose credit spread would be “guided” by the arrangers in a range of +50-55bps (also called initial price talk). The second (B) is identical to the first (A) with an additional “virtuous” demand of € 150m at + 30bps (this level does not play any role in itself), outside the indicated and consensual credit range (so an off-market bid). The price at which the issue gets feasible corresponds to the price of the last order allowing the booksize to reach the requested total size of € 500m. This “virtuous” demand could only play a very marginal role in shifting the price of the entire issue. In our example, the “virtuous” extra € 150m would make it possible to price the deal at a spread of + 53bps instead of + 54bps. One basis point. This is the order of magnitude corresponding to our quite revolutionary assumption. A working hypothesis to which we do not adhere because we do not know of any “virtuous” investors, nor of “off-market” bids. But the important point here is that the order that determines the final and actual price will always respect the risk-return rationality for the considered credit. Stretching the example to the extreme, even with a “virtuous” off-market demand of € 499m, it is still the missing € 1m order that would set the price for the entire issue.

Order book A		
Credit spread	**Cumulated amount (mio€)**	**Orders (mio€)**
50	75	75
51	125	50
52	275	150
53	400	125
54	650	250
55	1000	350



Order book B		
Credit spread	**Montant Cumulated amount (mio€)**	**Orders (mio€)**
30	150	150
50	225	75
51	275	50
52	425	150
53	550	125
54	800	250
55	1150	350



In conclusion, except assuming a 100% “virtuous” placement - which no one supports - the primary process would limit the impact of theoretical “virtuous” investors at best to a few basis points, a few hundredths of a percentage rate.

Note that such an order of magnitude is obviously not compatible with taking into account the real costs of a transition. Who would reasonably think that a company executive makes an investment decision based on 1 basis point? You cannot imagine a company deciding to invest (or not) in a project according to this criterion. To illustrate further, consider a company financed 80% by debt (at 3%) and 20% by shares (with a required profitability of 12%). A measure of its cost of capital (Weighted Average Cost of Capital) would be equal to 80% * 3% + 20% * 12% = 4.80%. Reducing the cost of 100% of its debt (not just green bonds) by 2 basis points decreases the total to 4.78%. It is clear that this does not create any particular incentive for the borrower to select a green project rather than a brown project, via the associated financing cost. The internal rate of return for the considered project has not been changed, nor the company as a "portfolio of projects". In addition, such an order of magnitude is not significant with regard to credit spreads (our previous "s") and interest rates (our previous "i") volatility. On launch day, the issuer assumes a level of uncertainty that goes well beyond the basis point. Moreover, no one has ever heard of a Chief Financial Officer on a bond roadshow explaining to investors that his company's green project was contingent on his ability to raise funds "off the market" (for example at 2% when the market value of his credit would be 3%).

7. All market observations agree with the absence of a green premium

Unlike in the primary market, where the disproof involved an argument linked to the very structure of the bond offering process, in the secondary market where exchanges are negotiated over-the-counter between a seller and a buyer, the refutation can only be empirical, based on observations of yields.

Specifically, available data shows similar levels of yields between green and standard bonds from the same issuer. In our own analysis, starting from zero in the primary market, finding zero in the secondary market is obviously not a problem. For the proponents of a green premium, there is a real difficulty here - which has not been overcome - as much to theorize as to observe the transmission of the premium (if it had been paid by investors...) from the primary market to the secondary market. Indeed, if the premium existed in the primary market, it would have to either evaporate or to be retained in the secondary market. Neither one nor the other is observed. The reader further interested in this topic can consult a Working Paper (EL [2019]) dealing with it.

Let us add that if a green premium existed in the secondary market:

- this situation would result in potential arbitrage - the arbitrageurs would sell the ABC green bond (at the lower yield) while buying an ABC standard bond (with the higher yield) ;
- the liquidity of green bonds would be reduced (the "non-virtuous" do not participate of course (off-market expensiveness), the "virtuous" would have to agree on the level of premiums...). The UK Treasury which declined to issue green Gilts for years explicitly mentioned this liquidity argument to refrain from doing so (FT [2010]). However, for a reduced liquidity, investors normally require extra compensation, i.e. a higher return, not the other way around...

The absence of a green premium explains everything that would otherwise constitute market aberrations, both on the supply side and on the demand side. Indeed, if a green premium existed, how to explain that many issuers who could legitimately benefit from it would not take advantage of it? For example, the UK Treasury does not issue green Gilts while the French Treasury does issue green OATs - while they share the exact same function, the same role, to optimize the financing of their

State in the capital markets. Other examples, pure green players (issuers whose entire activities contribute to the transition) or quite simply those who launch green projects funded by standard bonds. How could we explain that the European Central Bank is a significant buyer of green bonds as part of its massive bond buyback programs ("Quantitative Easing")? If these bonds were to incorporate a green premium (a de facto subsidy as we saw), this would be in total contradiction to the key principle of market neutrality the ECB claims to follow. This principle implies that the ECB's monetary policy cannot distort market prices, for example by favoring one or another sector of activity (effectively substituting itself for politics). On the contrary, its management guarantees that its operations are easily absorbed at prices determined by the market ("The implementation of the Asset Purchase Program is guided by the principle of market neutrality and does not positively or negatively discriminate on the basis of environmental or any other criteria", ECB [2018]).

Finally, as we have noticed in the case of the World Bank, let us insist on the fact that green funds have never been necessary for the placement of green bonds since they are bought by investors just as standard bonds. There is therefore no reason why green bonds supply should correlate with green funds growth - indeed, we are seeing this absence of correlation in the market.

8. Conclusion

The green promise has no impact on the financial profile of the green bond, it does not contractually offer any benefit to its holder. As a result, traditional investors (professional credit buyers) cannot give it any pecuniary value. In the end, we got a little better than a proof of impossibility:

- as soon as traditional investors participate in the placement of a new green bond, the green premium can only be worth zero;
- the value of the green promise will always be zero on the secondary market from the point of view of professional credit buyers (and probably therefore more generally);
- the nullity of the value of the green promise is absolutely not dependent on the quality of the green project itself and/or on the borrower's associated commitment

The first point implies that "virtuous" investors (if they existed) would have to have their own segregated primary market to play an effective role. The price of the green promise in the primary market cannot be different from zero as long as the placement of the green bond involves traditional investors. There cannot be two rationales (one "virtuous", the other traditional), two prices. There is only one primary market, one price for the green bond in this market, valid for all of its buyers. For traditional investors who are the majority in the placement (but only one would be enough), the price of the green promise is necessarily zero, so it is zero for everyone.

The last point implies that the taxonomy debate is a major diversion from the basic reality of the green bond. The attention of many parties ("authorities", the European Commission expert group on Sustainable Finance, banks, the press, and even some activist NGOs who denounce the risks of greenwashing) is focused on said taxonomy, the shade of green, a risk of greenwashing ultimately of second order compared to the central question which is that of the usefulness of the green bond: without a price differential, what is its purpose?

What's more, the green bond does not bring any “additionality”. Additionality would mean that green bonds would not substitute for standard bonds that a borrower might issue, but would add to them, as a potential financing tool. This is not the case and all the players admit this point purely and simply (Paris Europlace [2016]), “the development of green bonds does not seem, as such, to stimulate a net increase in green investments for issuers who would not otherwise have such easy access to capital”. The financing argument for itself is not even found in the arrangers' sales pitch. The green bond does not particularly contribute to the financing of green projects, that is to say beyond what the standard bond market normally offers.

So, at equal prices, the green bond does nothing: the green bond offers the issuer no comparative advantage over the standard bond. It does not create a “price signal”, through a reduction in financing cost which would modify the behavior of issuers (corporates or States). For a given issuer, it does not modify either the bond risk or its return. It is only a standard bond with a non-contractual commitment/earmarking towards a green project (in good cases). Moreover, it does not offer any more solution for investors who would actively like to contribute to the financing of the transition (“virtuous” or others). This is ex-post greening: issuers finance their (green) projects on normal financing terms, projects that would be launched regardless of the existence of green bond format; investors normally buy the bonds (a mix of credit and rates) that they would otherwise buy. No change in the financial paradigm, no redirection of savings. This is a zero-sum game, involving at most c. 1-3% of the new bond issuance market. The market equilibrium is unaffected leaving those involved with the opportunity for a consensual “green” communication, obviously of interest to all stakeholders (supply, demand and intermediaries).

The standard bond market is actually a dead end given the *pari passu* and the simplicity required for what is a market of huge amounts. If a bond really achieved something, through a modification of the financial profile of the security (for example via a coupon rate indexed to the achievement of such or such a green and genuinely ambitious objective), it would at best result in a micro-market (there wouldn’t be many buyers or issuers).

Sources of credible green bonds could be the financing of projects where the issuer is the specific project structure itself, so-called project bonds with bond schedule exclusively paid from the cash flow generated by that project, without recourse to sponsors, but these are rather ill-suited to the bond universe (investors do not like excessively long maturities and construction risk) and the project still has to be green... The pure players could constitute another avenue. 100% of their debts could be deemed green. But “virtuous” investors still don't exist! This explains why the vast majority of these issuers do not issue green bonds. There is no benefit in doing so.

To those green bond issuers who find that “it doesn't work”, observing that their bond yields are not different from those of their standard bond issues, we wanted to explain why, what the green bond does not achieve, and above all, what it cannot.

To actually change the allocation of liquidity in favor of the transition in the risk-return paradigm, there is one condition: determining what a truly green asset is (from this point of view, taxonomy is useful), and two solutions: lower the profitability of brown (for example via a significant carbon tax) asset versus green assets (for example via subsidies, favorable taxation) or reduce the risk of green assets (for example via State guarantees). The green bond does none of that. It is not a particularly favorable tool for the transition, it is simply the support of green communication.

When you read, “more than X tons of CO2 avoided in 2018 thanks to the green bond of ABC”, you should read or understand “more than X tons of CO2 avoided in 2018 thanks to the bond of ABC”. In reality, the adjective “green” adds nothing here.

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